



Hardox[®] Guarantees

HARDOX[®]
WEAR PLATE

Hardox[®] Guarantees

SSAB continuously improves its production processes in order to develop new and better products. As a result, you get both closer tolerances and improved workshop properties.

Hardox[®] guarantees include tight thickness tolerances, tight flatness tolerances, and tight bending guarantees. These guarantees act as a complement to the Hardox[®] datasheets and further enhance our promise of optimal workshop performance.

Content Hardox® guarantees

Hardox® thickness guarantee	4
Hardox® length and width guarantee	6
Hardox® flatness guarantee	7
Hardox® bending guarantee	8
Flatness, edge camber & out-of-squareness	9
Hardox® round bars, tubes & pipes	10
Testing Hardox® wear plate	11
Distribution of inspection documents	12
Marking Hardox® wear plate	13
Anti-Corrosion painting Hardox® wear plate	14
Surface treatment of Hardox® sheet	15
Packing guidelines for Hardox® sheet	15
Palletizing Hardox® plate	16
Palletizing Hardox® sheet	17
Handling sensitive products	18
Service and support	19
Contact information	19

Hardox® thickness guarantee

Hardox® thickness guarantee - plate

Thickness tolerances are according to SSAB's thickness guarantee and are closer than those specified in EN 10029 (Class A), except for thicknesses exceeding 80 mm, for which the tolerance range is according to standard. The thickness shall be measured at any point situated more than 25 mm from the transverse or longitudinal edges of the plate.

Nominal thickness (mm)	Thickness tolerances (mm)		
	Min	Max	Within plate
$3.2 \leq t < 5.0$	-0.3	+0.3	0.4
$5.0 \leq t < 8.0$	-0.3	+0.4	0.5
$8.0 \leq t < 15.0$	-0.5	+0.4	0.6
$15.0 \leq t < 25.0$	-0.6	+0.4	0.6
$25.0 \leq t < 40.0$	-0.7	+0.8	0.7
$40.0 \leq t < 80.0$	-0.9	+1.4	1.2
$80.0 \leq t \leq 160.0$	-1.1	+2.1	1.5

Other tolerances can be supplied upon special agreement.
Please contact your local sales representative for more information.

Hardox® thickness guarantee - hot rolled cut-to-length sheet

Thickness tolerances are according to SSAB's thickness guarantee and are closer than those specified in EN 10051 for cut-to-length sheets. All values in the table conform to 1/2 EN Category D. The thickness shall be measured at any point situated more than 40 mm from the edges for product with mill edge and a minimum of 25 mm for product with trimmed edges.

Nominal thickness (mm)	Thickness tolerances for a nominal width w (mm)		
	$w \leq 1200$	$1200 < w \leq 1500$	$1500 < w \leq 1800$
$t \leq 2.00$	± 0.12	± 0.13	± 0.14
$2.00 < t \leq 2.50$	± 0.12	± 0.14	± 0.16
$2.50 < t \leq 3.00$	± 0.14	± 0.15	± 0.17
$3.00 < t \leq 4.00$	± 0.15	± 0.17	± 0.18
$4.00 < t \leq 5.00$	± 0.17	± 0.18	± 0.19
$5.00 < t \leq 6.00$	± 0.18	± 0.19	± 0.20
$6.00 < t \leq 8.00$	± 0.20	± 0.21	± 0.21

Other tolerances can be supplied upon special agreement.
Please contact your local sales representative for more information.

Hardox® thickness guarantee - cold rolled cut-to-length sheet

Thickness tolerances are according to SSAB's thickness guarantee, which corresponds to $\frac{3}{4}$ EN 10131 normal tolerances for cold rolled cut-to-length sheets. The thickness shall be measured at any point located more than 40 mm from the edges.

Nominal thickness (mm)	Thickness tolerances for a nominal width w (mm)	
	w ≤ 1200	1200 < w ≤ 1500
t ≤ 0.80	± 0.04	± 0.06
0.80 < t ≤ 1.00	± 0.06	± 0.07
1.00 < t ≤ 1.20	± 0.07	± 0.08
1.20 < t ≤ 1.60	± 0.09	± 0.10
1.60 < t ≤ 2.00	± 0.12	± 0.12
2.00 < t ≤ 2.10	± 0.14	± 0.16

Other tolerances can be supplied upon special agreement.
Please contact your local sales representative for more information.

Hardox® length and width guarantee

Hardox® length and width guarantee - plate

Length and width tolerances are according to those specified in EN 10029. According to EN 10029, the length of the plate is the length of the shorter of both longitudinal edges. The width shall be measured perpendicular to the major axis of the plate.

Nominal length (mm)	Length tolerances (mm)	
	Min	Max
$l < 4000$	0	+ 20
$4000 \leq l < 6000$	0	+ 30
$6000 \leq l < 8000$	0	+ 40
$8000 \leq l < 10000$	0	+ 50
$10000 \leq l < 15000$	0	+ 75
$15000 \leq l \leq 18000$	0	+ 100

Nominal thickness (mm)	Width tolerances (mm)	
	Min	Max
$t < 40$	0	+ 20
$40 \leq t < 150$	0	+ 25
$150 \leq t \leq 160$	0	+ 30

Mill edge tolerances upon request.

Please contact your local sales representative for more information.

Hardox® length and width guarantee – hot- and cold-rolled cut-to-length sheet

The length and width tolerances for Hardox® hot-rolled sheets exceed the tolerances given in EN 10051. The length and width tolerances for Hardox® cold-rolled sheets are according to the normal tolerances in EN 10131. The length of the sheet is the length of the shorter of both longitudinal edges. The width shall be measured at a right angles to the longitudinal axis of the product.

Length and width of hot-rolled sheet

Nominal length (mm)	Length tolerances (mm)	
	Lower	Upper
0 - 4000	0	3
4001 - 6000	0	4
6001 - 8000	0	5
8001 - 13000	0	6
13001 - 16000	0	8

Nominal width (mm)	Width tolerances (mm)			
	Mill edge		Trimmed edges	
	Lower	Upper	Lower	Upper
< 2200	0	+ 20	0	+ 2

Length and width of cold-rolled sheet

Nominal length (mm)	Length tolerances (mm)	
	Under	Over
$l < 2000$	0	+ 6
$l \geq 2000$	0	0.3 % of the length

Nominal width (mm)	Width tolerances (mm)	
	Under	Over
$w \leq 1200$	0	+ 4
$1200 < w \leq 1500$	0	+ 5
$w > 1500$	0	+ 6

Hardox® flatness guarantee

SSAB has four classes of flatness tolerances for Hardox®, depending on type of product and hardness. All classes conform to or exceed the specifications in the relevant standards.

Class	Product	Nominal thickness (mm)	Flatness (mm/1 m ruler) steel flatness
A	Hardox® 400 sheet Hardox® 450 sheet Hardox® 500 sheet Hardox® HiAce sheet	$2.0 \leq t \leq 8.0$	3
	Hardox® 500 Tuf sheet	$2.5 \leq t \leq 8.0$	
B	Hardox® 500 Tuf sheet	$2.0 \leq t < 2.5$	6
	Hardox® 450 CR sheet Hardox® 600 sheet	$0.8 \leq t \leq 6.0$	
C	Hardox® 400 plate Hardox® 450 plate Hardox® 500 plate Hardox® 500 Tuf plate Hardox® HiTemp plate Hardox® HiAce plate Hardox® HiTuf plate	$3.2 \leq t < 4.0$	15
		$4.0 \leq t < 5.0$	7
		$5.0 \leq t < 6.0$	5
		$6.0 \leq t < 20.0$	4
		$20.0 \leq t \leq 130.0$	3
		$130.0 < t \leq 160.0$	4
D	Hardox® 550 plate Hardox® 600 plate Hardox® Extreme plate	$4.0 \leq t \leq 5.0$	12
		$5.0 < t < 25.0$	10
		$25.0 \leq t < 40.0$	9
		$40.0 \leq t \leq 65.0$	8

Class A is closer than EN 10051.

Class B is closer than EN 10051 and EN 10131 special tolerances.

Class C is closer than EN 10029 steel type L (Class N), except for thicknesses < 4.0 mm.

Class D is according to EN 10029 steel type H.

Short waves (300-1000 mm) according to EN 10029.

In the case of discrepancies, the given class in the EN English version shall prevail.

Hardox® bending guarantee

SSAB has six bending guarantee classes for plate and cut-to-length sheets according to the table below. The bending guarantees for Hardox® wear plate and sheets are based on a dies with rolls and normal friction (no lubrication). These bend guarantees are based on bend tests of one step to 90° after unloading.

The bending guarantees conform to and exceed the requirements in EN ISO 7438.

Class	Product	Nominal thickness (mm)	Transverse to rolling direction minimum Rp/t	Along rolling direction minimum Rp/t	Die opening width (W) minimum W/t
A	Hardox® 400 sheet Hardox® 450 sheet Hardox® HiAce sheet Hardox® 500 Tuf sheet	$2 \leq t < 4$	3.0	4.0	12
		$4 \leq t \leq 8$	3.0	3.5	12
B	Hardox® 450 CR sheet	$0.8 \leq t < 2.1$	4.0	4.0	12
C	Hardox® 500 sheet	$2 \leq t \leq 7.0$	3.5	4.0	12
D	Hardox® 400 plate	$t < 8$	2.5	3.0	12
		$8 \leq t < 20$	3.0	4.0	14
		$20 \leq t < 50$	4.0	5.0	16
E	Hardox® 450 plate Hardox® 500 Tuf plate Hardox® HiTemp plate Hardox® HiAce plate	$t < 8$	3.0	3.5	12
		$8 \leq t < 20$	3.5	4.5	14
		$t \geq 20$	4.5	5.0	16
F	Hardox® 500 plate	$t < 8$	3.5	4.5	12
		$8 \leq t < 15$	4.0	4.5	14
		$15 \leq t < 20$	4.5	5.0	14
		$t \geq 20$	5.5	6.0	16

Rp/t stands for punch radius (Rp) divided by thickness (t).

Die opening widths are guidelines and may vary somewhat without affecting bending results.

The guaranteed values for bending are valid under conditions given in the brochure Bending of Hardox® wear plate. In the case of discrepancies, the given class in the EN English version.

Flatness, edge camber & out-of-squareness

The information below is a presentation of how to inspect your SSAB deliveries using the product guarantees.

This information is according to EN 10029 for plates, EN 10051 for cut-to-length sheets and EN 10131 for cold rolled materials. For more information, please contact your local sales representative or Tech Support.

Flatness measurement

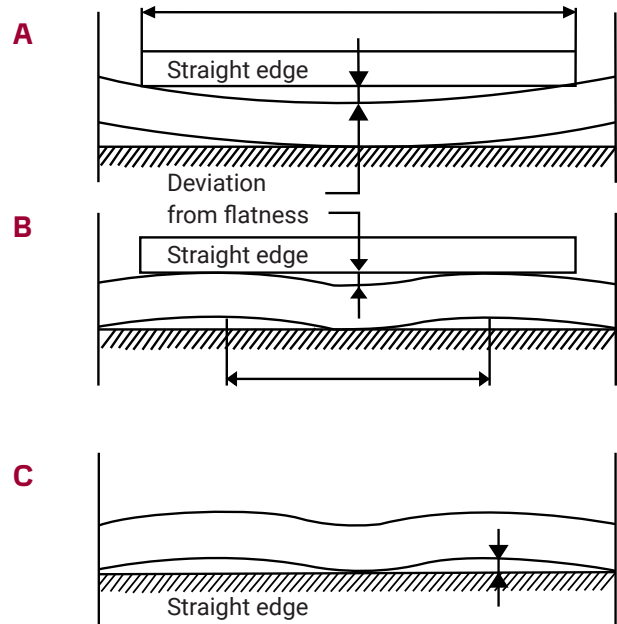
To determine the flatness deviation during production, the plate/sheet is measured manually or by laser. The measurement conforms to the manual procedure according to EN 10029 and EN 10051.

Flatness measurement for plate is according to EN 10029. The plate is measured at least 25 mm from the long side of the plate and at least 200 mm from its short side.

The vertical height is rounded off to the nearest mm. See figure A and B.

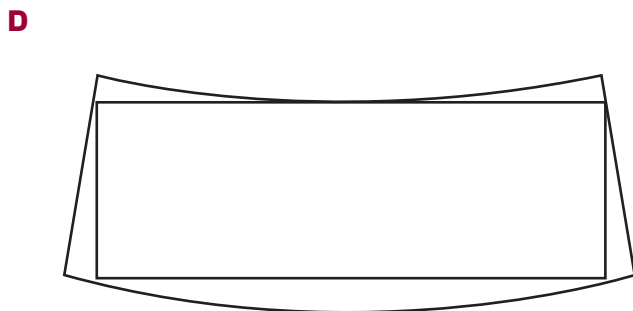
Flatness measurement for cut-to-length sheet is according to EN 10051. Flatness deviation for sheet is determined by measuring the deviation in distance between the product and a flat horizontal surface on which the sheet is placed.

The vertical height is rounded off to the nearest mm. See figure C.



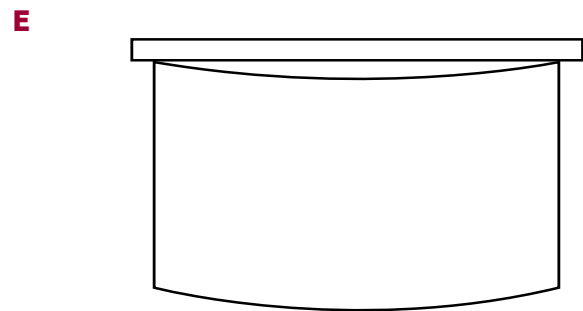
Edge camber and out-of-squareness plate

According to EN 10029, it must be possible to inscribe a rectangle having the dimensions of the ordered plate within the plate supplied. See figure D.



Edge camber and out-of-squareness sheet

According to EN 10051, the edge camber is the maximum deviation of a longitudinal edge from a straight edge measuring base applied to it. The camber is measured on the concave edge. See figure E.



Hardox® round bars, tubes & pipes

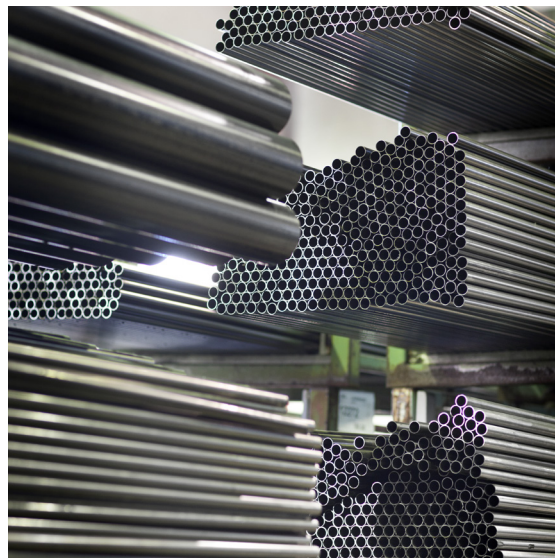
**SSAB is a producer of high-quality Hardox® round bars, tubes and pipes.
We continuously work on developing and improving our products and offering.**

For more information on dimensions, lengths and other requirements, please see the respective data sheets, contact your local sales representative or Tech Support.

Hardox® Tubes and pipes

Hardox® tubes and pipes tolerances are based on the requirements of EN 10210. The tubes and pipes are as hard and tough as the flat Hardox® products, and despite their hardness, Hardox® tubes and pipes can be welded, cut, milled and drilled using standard workshop practices.

Hardox® tubes and pipes are delivered in quenched and tempered condition. More information on dimensions and tolerances for Hardox® tubes and pipes is described in respective data sheets.



Hardox® Round bar

Hardox® round bar tolerances are according to EN 10060. Hardox® round bars are delivered quenched and tempered with high tensile strength. Hardox® round bars are versatile, ready-to-use, abrasion-resistant steels that combine high toughness, good bendability and good weldability with the same guaranteed hardness and properties as for Hardox® wear plate.

Hardox® round bars are delivered in black condition, peeled surface available upon request. The maximum available length depends on the product's diameter. Please contact your local sales representative for more information.



Testing Hardox® wear plate

Unless otherwise agreed, inspection and testing are carried out and the results are reported as specified in the relevant material standard or in our data sheets.

When placing your order, always specify whether the material requires special inspection, the scope of such an inspection, and the type of inspection document required.

Mechanical testing

Impact testing is performed in accordance with ISO 148-1 or appropriate ASTM or national standard.

Hardness testing in accordance with EN ISO 6506-1, 6507-1, 6508-1 or appropriate ASTM or national standard.

Ultrasonic testing

Ultrasonic testing is performed upon agreement according to EN 10160 or equivalent national standard. SSAB guarantees internal soundness corresponding to EN 10160 class E₁, S₁ for plates in thicknesses up to and including 100 mm. For plates above 100 mm thickness, SSAB guarantees internal soundness corresponding to EN 10160 class E₀, S₀ unless otherwise agreed. For more information, please contact your local sales representative.

Distribution of inspection documents

SSAB has a certificate system that electronically produces, distributes and records all types of inspection documents.

The documents are delivered as PDF files. The certificate system offers excellent opportunities for simple and rational handling of inspection documents.

Inspection documents

Unless otherwise agreed, certificates are issued in English in accordance with SS-EN 10204:2004. The certificates include the particulars specified in the material standard, which usually include:

- Name of manufacturer.
- Clear reference to the purchase agreement and delivery batch.
- Material designation in accordance with the purchase agreement.
- Description of product.
- Nominal dimensions.
- Quantity.
- Results of inspection.
- Date of issue.

The following types are available:

Inspection certificate 3.1

The inspection certificate declares that the products delivered conform to the requirements of the purchase agreement. The results of testing are shown for the products that will be delivered or on inspection batches comprising part of the products delivered. The document is validated by an inspection representative who is authorized by the manufacturer and who is independent of the production department.

Inspection certificate 3.2

The inspection certificate declares that the products delivered conform to the requirements of the purchase agreement. The results of testing are shown for the products that will be delivered or on inspection batches comprising part of the products delivered. Documents are issued both by the inspection representative authorized by the manufacturer and either by an inspection representative authorized by the customer or by an inspector appointed in accordance with official regulations.

Marking Hardox® wear plate

All products are clearly marked upon delivery. For thicknesses above 5 mm, the steel grade and product identity are stamped, unless stamping is excluded by the applicable standard or agreed otherwise. For thicknesses of 5 mm and below, or where stamping is not carried out for other reasons, marking is applied using ink or white paint.

Product identity

All production systems (works, plants, facilities) within the SSAB group have their own production identity systems and identity codes. The product identity code combines numbers, letters and symbols in one text string. The maximum number of characters is 25. The product identity is unique and consists of two groups or three groups of characters with each group containing up to six or seven characters, respectively. These groups of characters give every product a unique identity. Example of product identities from SSAB are listed below. For certain production facilities, the location of the stamped marking may be shown by two white-painted dots. Contact your local sales representative for more detailed options.

Heat number (6) - Serial number (6 or 7) = 13 - 14 characters.
Example: 095150 - 555621.

Heat number (6) - Serial number (6 or 7) - Stock item number (4) = 18 - 19 characters.
Example: 097495 - 7569850 - 4910.

Heat number (6) - slab number-plate number - bundle number.
Example: A19123 - ABC12 - A12 - 1234567.

Product ID (6 - 3 - 3) = 14 characters.
Example: W7C123 - A05 - A01.

Product ID (X - X - X) = X characters.
Example: 095150 - 555621 - 001.

Coil number (5 - 7) - Bundle number (1 - 3) = 9 - 11 characters.
Example: C89613 - 10 (or HC89613 - 10 on Odette label).

Marking and stamping

The steel grade and plate identity are always low-stressed stamped perpendicular to the rolling direction. For products without stamping, the steel grade and product identity are marked and the rolling direction is ink marked with arrows. Marking with paint may be carried out in the direction of rolling.

The customer's mark, product dimensions of length, width and thickness, product identity and the pile number for internal use are marked on the product. The marking is performed with white paint dot-matrix printing or black ink jet marking. The location of the stamp is occasionally indicated with two white-painted dots.

Brand marking

Unless otherwise agreed, to maintain traceability of the material at its destination SSABs products are marked as follows: Painted product is normally marked in a number of rows over the entire product upper surface. Unless otherwise agreed, a simplified steel grade designation and SSAB are painted. The product identity can also be marked in rows over the product surface.

Note that the complete steel grade designation in accordance with the standard/data sheet or specification is stamped or is included in the paint marking.

Anti-corrosion painting Hardox® wear plate

Unprotected steel plate will corrode. SSAB can therefore provide the plate with effective anti-corrosion treatment known as shop primer. This protects the product while it is in transit.

The primer types we use have been tested by various institutes to ensure good working conditions for the end user. If good ventilation is provided, the hygienic limit values will not be exceeded in conjunction with welding, cutting or grinding.

Regardless of the anti-corrosion treatment specified, the appearance and cleanliness of the steel surface before treatment are decisive for the effectiveness of the anti-corrosion treatment. We shot-blast the plate, which is then immediately anti-corrosion painted. The primers used are mainly of low-zinc silicate.

The plate we keep in stock is painted with low-zinc silicate primer, since it does not need to be removed before normal welding. If there is a high demand on the weld quality, or if the welding is performed on materials with low heat input, then SSAB recommends that the primer shall be removed. More welding recommendations can be found in SSAB's brochure Welding of Hardox®.

Hardox® is primed with a red color unless otherwise agreed. Before selecting the final paint system, the relevant paint supplier should be consulted.

Shop primer

Type	Color	Protection time
Low zinc	Red	6 months

Degree of blasting SA 2.5 as per ISO 8501-1.

Surface treatment of Hardox® sheet

SSAB offers different types and degrees of oiling as a surface treatment for Hardox® cut-to-length sheets. The purpose of the oil is to protect the steel during transport.

SSAB offers both untreated and oiled surfaces for Hardox® cut-to-length sheets. The standard oil for surface treatment is anti-corrosion oil, other options may be possible. Contact your local sales representative for support to determine the most appropriate surface treatment.

Packing guidelines for Hardox® sheet

SSAB offers different packing options for cut-to-length sheets. Hardox® sheets are produced and packed at different locations, so the packing alternatives may differ. When placing your order, always specify whether the material should be subject to special agreement.

SSAB has three different packing alternatives for cut-to-length sheet: Base, Light and Export. Their basic function is to protect the sheet during transport. The packing does not provide any guaranteed protection against corrosion or handling damage.

There are several package options and different packing types. The packaging will be planned together with sale support to determine the most appropriate practice.

Quantities per package for Hardox® sheets

Product	Package weight (kg)		Package height (mm)	
	Min	Max	Min	Max
Hardox® hot rolled sheet	600	16 000	30	600
Hardox® cold rolled sheet	1200	7800	30	380

Available packing types

- Stretchfilm covering front end of bundle for label attachment.
- Plastic foil.
- Paper foil.
- Stretchfilm covering entire bundle.
- Edge protection profiles covering the upper longitudinal edges.
- Cross strapping with strapped interlayers.
- Pallet, nailed or glued.
- Identity label on shortside and longside.

Palletizing Hardox® plate

Our delivery standard presents rules and guidelines for palletizing the deliveries.

Please note that Hardox® plates are produced and delivered from different locations, so the palletizing options may differ. When placing your order, always specify whether the material should be subject to special agreement.

The aim of the standard is to palletize the material in a way that prevents handling damage to the greatest extent possible, and that creates cost-effective and manageable volumes.

For deliveries in which SSAB is responsible for loading, the goods are always secured in accordance with the laws and regulations in force at that time. To regulate who pays for freight and insurance, we apply either CIP or CIF 2020 delivery conditions.

Definitions

Pallet	A platform loaded with packages. The pallets are separated with timber spacers measuring 63 x 90 mm.
Stack	A partial load on a pallet. Separated from other stacks by timber spacers measuring 32 x 32 mm.
Pallet label	A label attached to the top plate on a pallet containing the printed pallet number, bar code, painted color code, quantity, weight, and the identity of the top plate.
Color coding	Painted color coding on the short and/or coding long side of the plate for delivery by sea.
Short plate	Plate <6100 mm long.

General pallet rules

- The maximum pallet weight is 12 tonnes.
- Thick and thin plates are never loaded on the same pallet, when ordered from stock.
- Painted and unpainted plates are never loaded on the same pallet.
- The widest plate is always at the bottom on the pallet.
- Gradual width loading (widest plate on the pallet, gradually diminishing to the narrowest at the top) is employed for plate thicknesses <30.1 mm.
- Random length loading (plates of different lengths are loaded in random order) is employed.
- Some thin plate may be strapped.

Options

- Strapping applied around both the pallet and the stacked material. Maximum plate length: 6099 mm.
- Stack weights as agreed.
- Pallet weights as agreed.
- Special color coding.
- Delivery codes outside the standard.
- Other requirements on dimensional separation.

Optional marking

- On the top plate on a pallet or stack. Up to 3 lines with 21 characters (manual marking)* stack, up to 3 lines.
- Edge label attached on the thickness surface of the short side. Available in three variants with different information about the plate. Edge label possible above 8 mm thickness.

* Carried out free of charge, if required.

Palletizing Hardox® sheet

Our delivery standard presents the rules and options for bundling and palletizing the deliveries.

Please note that Hardox® cut-to-length sheets are produced and delivered from different locations, so the palletizing options may differ. When placing your order, always specify whether the material should be subject to special agreement.

The aim of the standard is to palletize the material in a way that avoids handling damage and that creates cost-effective and manageable volumes.

For deliveries in which SSAB is responsible for loading, the goods are always secured in accordance with the laws and regulations in force at that time. To regulate who pays for freight and insurance, we apply either CIP or CIF 2020 delivery conditions. Exceptions can be made for certain conditions.

Definitions

Pallet	A platform loaded with packages. The pallets are separated with timber spacers measuring 72 x 72 mm or 90 x 90 mm.
Stack	A partial load on a pallet. Separated from other stacks by timber spacers measuring 32 x 32 mm.
Bundle	A single brand of sheets packed together.
Pallet label	Identity label on shortside and longside.
Edges	Edge protection profiles covering the upper longitudinal edges.

General pallet rules

- The maximum pallet length is 16 000 mm.
- All sheets in the same pallet have the same dimension.
- Short and long sheets are never loaded on the same pallet.
- All sheets can be stacked.
- Wood secured to bundle.

Storing recommendations

- Dry environment.

Options

- Stack weights as agreed.
- Pallet weights as agreed.
- Special color coding/packing.
- Delivery codes outside the standard.
- Other requirements on dimensional separation.

Handling sensitive products

Hardox® wear plate is an abrasion-resistant steel and can be used in many different tough components and structures.

SSAB offers Hardox® products in high quality for many purposes and with different properties. The recommendations below are suitable for all Hardox® products, but are extra important when handling Hardox® 600 and Hardox® Extreme.

Hardox® Extreme and Hardox® 600 are produced to be used in extreme wear conditions with high demands. The properties are excellent for their purpose but the plates need to be handled with care during delivery, storing and processing in order to avoid cracks. Please carefully read the following recommendations.

When lifting

- Avoid "three point bending".
- When using a crane, always lift the plates with evenly widespread attachment points.
- When using a truck, adjust the lifting forks along the length of the material for an even weight distribution.

When storing

- Store the plates indoors.
- Avoid rust.
- Place on top of timber and continue to stack with timber, allow air flow between the plates and timber.
- The timbers should be placed directly vertical under each other to avoid three-point bending.

When processing

- Appropriate health and safety precautions must be taken.
- Follow SSAB processing recommendations.
- Before processing, let the plate adjust to room temperature.
- Let the material rest in room temperature after being processed.



Example of a three-point lift with a crack as a result.



Example of a three-point force during storage.

A man wearing a yellow hard hat and a plaid shirt is shown in profile, holding a yellow walkie-talkie to his mouth. He is standing in front of large, dark, curved metal structures, likely part of a steel mill. The background is slightly blurred, showing more industrial equipment and a cloudy sky.

Service & support

SSAB offers extensive service and support to customers. We have a long tradition of helping customers to develop their steel products and processes with our unique knowledge. Unlike other steel mills SSAB offers two different services, Tech Support and the Knowledge Service Center. We offer technical and innovation support as well as technical training, handbooks and tools to help you become more productive.

SSAB offers advanced logistics solutions, including stock services worldwide, mill-direct deliveries, processing and logistics management solutions.

Contact information

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SSAB is a Nordic and US-based steel company that builds a stronger, lighter and more sustainable world through value added steel products and services. Working with our partners, SSAB has developed SSAB Fossil-free™ steel and plans to reinvent the value chain from the mine to the end customer, largely eliminating carbon dioxide emissions from our own operations. SSAB Zero™, a largely carbon emission-free steel based on recycled steel, further strengthens SSAB's leadership position and our comprehensive, sustainable offering independent of the raw material. SSAB has employees in over 50 countries and production facilities in Sweden, Finland and the US. SSAB is listed on Nasdaq Stockholm and has a secondary listing on Nasdaq Helsinki.

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